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DYNAMIC ANALYSIS OF AIRCRAFT LANDING GEAR

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To my beloved mother and father

The brightest lights in my darkest nights

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ABSTRACT

Landing gear dynamics, especially shimmy and break-induced vibrations, is one of the problems faced today by the aircraft community. Landing gear vibration may lead to fatal accidents due to excessive wear; it can also shorten the gear life, and affect comfort to the pilot and passengers. Among the most important reasons for landing gear vibrations are unsuitable combination of structural stiffness, damping, and pneumatic tire characteristics furthermore an unlucky combination of brake system design with the tire physics can produce a serious vibration problem. Many available computer-aided engineering tools and software have made it possible to test some of the problems in the design phase by simulating the landing gear impact and ground maneuvers. In this study, it has been conducted to simulate the simplified model of aircraft Eagle-150 in MSC. ADAMS software and work on the simulation of such an unstable and complex phenomenon during landing position and also aircraft ground maneuver in order to detect vibrations in aircraft landing gear. It has also been tried to study the effect of important parameters that may affect the instability and comfort a simple simulated model of aircraft and its landing gear was prepared using ADAMS for this purpose. An adequate model of aircraft and landing gear is an important aspect of analysis in order to understand the behavior of an aircraft during landing and ground maneuver. Effect of various parameters on landing gear vibration is also one the purposes of this study.

ABSTRAK

Dinamik gear pendaratan, terutama *'Shimmy'* dan getaran berpaca dari brek, adalah salah satu masalah yang dihadapi oleh kebanyakan pesawat hari ini. Getaran gear pendaratan boleh membawa kepada kemalangan maut akibat kehausan melampau, selain boleh memendekkan hayat gear, getaran pada gear pendaratan juga menjejaskan keselesaan kepada juruterbang dan penumpang. Salah gatu sebab-sebab yang paling penting untuk getaran gear pendaratan adalah gabungan yang tidak sesuai di antara kekukuhan struktur, redaman dan ciri-ciri tayar pneumatic. Seterusnya, gabungan rekabentuk sistem brek dengan fizik tayar boleh menghasilkan masalah getaran yang serius. Terdapat banyak alat bantuan komputer kejuruteraan dan perisian telah dibuat untuk menguji beberapa masalah dalam fasa reka bentuk melalui simulasi kesan pendaratan gear dan gerakan di atas landasan. Dalam kajian ini, model ringkas pesawat Eagle-150 telah disimulasikan di perisian MSC. ADAMS. Kerja simulasi mengambil kira fenomena yang tidak stabil dan kompleks semasa kedudukan pendaratan dan juga manuver pesawat di atas landasan untuk mengesan getaran dalam gear pendaratan pesawat. Ia juga telah disimulasikan untuk mengkaji kesan parameter penting yang boleh menjejaskan ketidakstabilan model simulasi pesawat dan gear pendaratan. Satu model lenakap gear pesawat dan gear pendaratan adalah aspek penting dalam analisis untuk memahami tingkah laku pesawat semasa pendaratan dan manuver diatas landasan. Kesan parameter pelbagai getaran gear pendaratan juga merupakan salah satu tujuan bagi kajian ini.